

## Claims

- [c1] 1.A swivel assembly for a downhole tool string, comprising:  
first and second coaxial housings cooperatively arranged;  
the first housing comprising a first transmission element in communication with surface equipment;  
the second housing comprising a second transmission element in communication with the first transmission element and a third transmission element adapted for communication with a network integrated into the downhole tool string;  
and an electronic circuitry in electrical communications with one of the transmission elements.
- [c2] 2.The swivel assembly of claim 1, wherein the second housing is rotational and adapted to transmit a signal between the downhole network and the first housing.
- [c3] 3.The swivel assembly of claim 1, wherein an internal conductor is disposed within a passage of the second housing and connects the second and third transmission elements.

- [c4] 4.The swivel assembly of claim 1, wherein an external conductor connect the first transmission element and surface equipment.
- [c5] 5.The swivel assembly of claim 4, wherein the external conductor is a copper wire, a coaxial a cable, twin axial cable, a triaxial cable, a fiber optic cable, or a ribbon cable.
- [c6] 6.The swivel assembly of claim 1, wherein the electronic circuitry is disposed in housing externally mounted to the first housing.
- [c7] 7.The swivel assembly of claim 1, wherein the electronic circuitry is disposed in housing internally mounted in the second housing.
- [c8] 8.The swivel assembly of claim 1, wherein the electronic circuitry is disposed in housing externally mounted to the second housing.
- [c9] 9.The swivel assembly of claim 1, wherein the electronic circuitry is disposed in a recess in the second housing.
- [c10] 10.The swivel assembly of claim 9, wherein the recess is between the second and third transmission elements.
- [c11] 11.The swivel assembly of claim 9, wherein the recess is disposed in an inner circumference of the second hous-

ing or an outer circumference of the second housing.

[c12] 12.The swivel assembly of claim 1, wherein the electronic circuitry is disposed in a recess in the first housing.

[c13] 13.The swivel assembly of claim 1, wherein a shield is externally mounted to the first or second housing adapted to protect a connection between the first and second housings from debris.

[c14] 14.The swivel assembly of claim 13, wherein the shield comprises a means for lubricating the connection between the first and second housings.

[c15] 15.The swivel assembly of claim 1, wherein the electronic circuitry comprises components selected from the group consisting of a signal filtering circuit, a signal error checking circuit, a device control circuit, a modem, a digital processor, an optical regenerator, an optical transmitter, an optical receiver, a repeater circuit, a sensor, a router, a switches, memory, an amplifier, a clock source, OLE\_LINK1a data compression circuit, a data rate adjustment circuitOLE\_LINK1, a piezoelectric device, a light, a gauge, a wireless transceiver, a digital/optical converter, an analogue/optical converter, and a micro-controller.

[c16] 16. The swivel assembly of claim 1, wherein the swivel assembly further comprises an internal power source.

[c17] 17. A swivel assembly for a downhole tool string, comprising:  
first and second coaxial housings cooperatively arranged;  
the first housing comprising a first transmission element in communication with surface equipment;  
the second housing comprising a second transmission element in communication with the first transmission element and a third transmission element adapted for communication with a network integrated into the downhole tool string;  
the second housing having a cylindrical form comprising an inner circumference and an outer circumference, wherein the second housing is disposed within the inner circumference of the first housing;  
an internal conductor disposed in a passage of the second housing and connecting the second and third transmission elements;  
a shield externally mounted to the swivel assembly adapted to protect a connection between the first and second housing; and  
an electronic component in communications with the first transmission element and externally mounted to the

first housing.

- [c18] 18.The swivel assembly of claim 17, wherein a shield is externally mounted to the first or second housing adapted to protect a connection between the first and second housings from debris.
- [c19] 19.The swivel assembly of claim 18, wherein the shield comprise a means for lubricating the connection between the first and second housings.
- [c20] 20.The swivel assembly of claim 17, wherein the electronic circuitry comprises components selected from the group consisting of a signal filtering circuit, a signal error checking circuit, a device control circuit, a modem, a digital processor, an optical regenerator, an optical transmitter, an optical receiver, a repeater circuit, a sensor, a router, a switches, memory, an amplifier, a clock source, a data compression circuit, a data rate adjustment circuit, a piezoelectric device, a light, a gauge, a wireless transceiver, a digital/optical converter, an analogue/optical converter, and a microcontroller.
- [c21] 21.The swivel assembly of claim 17, wherein the swivel assembly further comprises an internal power source.